Faculty of Cognitive Science and Human Development

FACTORS THAT INFLUENCE THE USAGE OF TECHNOLOGY IN AN ORGANIZATION: A CASE STUDY ON SUPPORT STAFF IN UNIMAS

Mejuli Mengga

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FACTORS THAT INFLUENCE THE USAGE OF TECHNOLOGY IN AN ORGANIZATION: A CASE STUDY ON SUPPORT STAFF IN UNIMAS

by

Mejuli Mengga

This project is submitted in partial fulfilment of the requirements for a
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Universiti Malaysia Sarawak

The project entitled 'Factors That Influence The Usage of Technology In An Organization : A Case Study On Support Staff In UNIMAS' was prepared by Mejuli Mengga and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfilment of the requirements for a Bachelor of Science with Honours (Human Resource Development)

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Mejuli Mengga (5413)
UNIMAS
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ABSTRAK

Kajian ini bertujuan bagi mengenalpasti dan mengkaji faktor-faktor yang mempengaruhi penggunaan teknologi dalam organisasi bagi pekerja sokongan yang bekerja di Universiti Malaysia Sarawak. Responden telah dipilih dengan menggunakan persampelan rawak mudah. Instrumen yang terlibat dalam kajian ini telah telah diperolehi daripada bacaan daripada buku-buku berkaitan, jurnal, dan thesis para penyelidik dalam bidang ini. Instrumen ini digunakan bagi mengukur kesan faktor-faktor yang telah terpilih dalam penggunaan teknologi dalam organisasi. Kolerasi Pearson 'r' yang digunakan untuk menganalisis faktor-faktor pembelajaran dalam organisasi, struktur organisasi dan kebolehdayasaingan organisasi. Dapatan kajian menunjukan cuma terdapat satu aspek yang mempunyai perkaitan yang signifikan. Aspek pembelajaran dalam organisasi telah dikenalpasti sebagai faktor yang mempengaruhi penggunaan teknologi dalam organisasi bagi pekerja sokongan di Universiti Malaysia Sarawak, Kota Samarahan. Oleh itu, pembelajaran dalam organisasi melalui penggunaan teknologi harus ditekankan agar menyumbang kepada jangka hayat yang panjang bagi organisasi.

ABSTRACT

The aim of this study is to determine the factors that influence the usage of technology on the support staff in Universiti Malaysia Sarawak. A random sampling is used to collect data from the respondents. The instrument used in this study is designed through readings from books related to the study, journals and thesis by researchers in this field. The instrument in this research is used to measure the effects of the factors chosen that influence the usage of technology in the organization. Pearson Correlation 'r' was used to analyze the factors, which are organizational learning, organization structure and organization competitiveness. Research findings indicate that there is only one factor that has a significantly strong relationship with the usage of technology in the organization. The factor that influences the usage of technology among the support staff of Univeristi Malaysia Sarawak is organizational learning. Therefore, the organization must be increase organizational learning by facilitating it through the usage of technology. This ensures a longer life span for the organization.

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CHAPTER ONE
INTRODUCTION

1.0 Introduction

This is the era of information revolution. Technology plays an important role in our everyday life (Hamel & Pralahad, 1994). Organizations cannot run away from the fact that they have made technology as part of the value activities in order to survive. It has become necessary for them to create and sustain the organization by utilizing the right technology for their type of business. Researchers found that it is important for an organization to evolve together with the technology in order to survive in the global economy (Ghingold & Johson, 1998). The reason behind this is because technology can assist the organization to create competitive advantage therefore, creating organization competitiveness.

The organization's optimal use of current technologies relevant to its industry and markets in creating sources or positions of advantage is implied in early competitive advantage (Day & Wensley, 1988; Porter, 1985). In order to realize this organization competitiveness, it is vital to understand both the technologies used and the ways in which organizations can best manage technology. These issues are of increasing importance as the pace of technology development and its complexity increases (Farrukh *et al.*, 2001).

Therefore, to identify the roles of technology in organization, how technologies influences an organization need to be taken into consideration. In this paper, the researcher considers the selected factors in an organization that can influence how technology is being used in the organization. The selected factors are organization structure, organization competitiveness and organization learning.

1.1 Background of Study

An effective management of technology is important for an organization to fully utilize the technology they have. To do this, the organization has to identify what are the factors within the organization itself that influences the use of technology to maximize their potentials. Then will they be able to manage technology. Organization leaders should realize the impact the technology has on them. Now, the focus of technology in organizations is towards managing with technological innovation in computerized design, production, communication and information technologies. Herink called this newer change in management practice, "managing with technology" (Herink, 1994).

Researchers had found that it is necessary to understand, communicate and integrate technology into strategy of an organization such as marketing, financial, operations and human resource (Farrukh *et al.*, 2002). This is of particular importance when one considers the increasing cost, pace and complexity of technology development. The rising level of activity in the areas of technology is an indication of existing trends and the trends of the future. This can be seen in the work of Clarke and Reavley (1993) who provide a bibliography of published

papers in the area of science and technology management, including over 10,000 references, up from 3,000 in 1981.

Effective implementation of a technology requires management of the associated processes at the operational level. A strategy is only of value if mechanisms for its implementation and renewal are in place (Gregory, 1995). Constant change in technology requires technology assessment (Coates, 1976), as the effect on organization that may occur when a technology is introduced, extended or modified, with the emphasis on the impacts.

Organization leaders should be well prepared to manage in an environment where fast technological changes are common. In order to do that, the organization structure, organization competitiveness and organization learning need to be evaluated and revised to know how well the employees in the organization is able to cope with the fast pace change in the world of technology. The management should continuously forecast. Manage and assess technology as part of the strategy. The leaders should realize that these three factors contribute to the organization's success in the future.

1.2 Problem Statement

Technology has certainly changed the way we work. The speed of technological change has also forced organizations to become more creative in the way they structure their people resources to ensure that they are the most productive (Robertson, 2000). The biggest challenges for the human resource functions today are to attract and retain the knowledge workers that are required to develop and use these new technologies. They also have to ensure that they do not forget about the organization's current resources, as the skill sets of these knowledge workers are typically very portable. A study done of Watson Wyatt Worldwide by Schellenbarger (2000) has identified that the business cost of turnover was one and a half times an employee's annual pay. This is a significant cost, especially when applied to highly paid knowledge workers.

Due to this reason, and others, some organization leaders find it discouraging to pursue the use of technology in their organization as it is always changing. Is it good or is it bad? Like the saying goes, "if you cannot beat them, join them." Organization leaders should know that for them to be successful in the future, they have to analyze what kind of technology matches their type of business. They should know how these technologies could help them to achieve their goals. Before that, they have to know the mechanisms within the organization such as organization structure, organization competitiveness and organizational learning. These challenges of change towards a technological era should not be seen as a hindrance but as doors to opportunities.

The technology revolution may sound splendid but analyzing the effects it will and already have on organization, probably is the most critical part (Bahouth, 1994). This is how a leader is able to plan and forecast technologies. This knowledge will assist the organization leaders to create a strategic weapon for the survival of the organization. In this paper, the researcher has selected a few factors that might contribute to the organization's success in usage of technology.

1.3 Objectives of Research

1.3.1 General Objectives

The focus of this research is to investigate whether the selected factors influence the usage of technology in the organization's view, which have to be identified in order to achieve success and longer life span for the organization.

1.3.2 Specific Objectives

1.3.2.1 To find out whether organization structure influence the use of technology in the organization.

1.3.2.2 To find out whether organization competitiveness influence the use of technology in the organization.

1.3.2.3 To find out whether organizational learning influence the use of technology in the organization

1.3.2.4 To find out the dominant factors among the three factors influence the use of technology in the organization.

1.4 Independent and Dependent Variables

The research conceptualizes that the organization management and leaders need to identify the factors that influence the usage of technology in the organization. The conceptual of the research is shown in Figure 1 below:

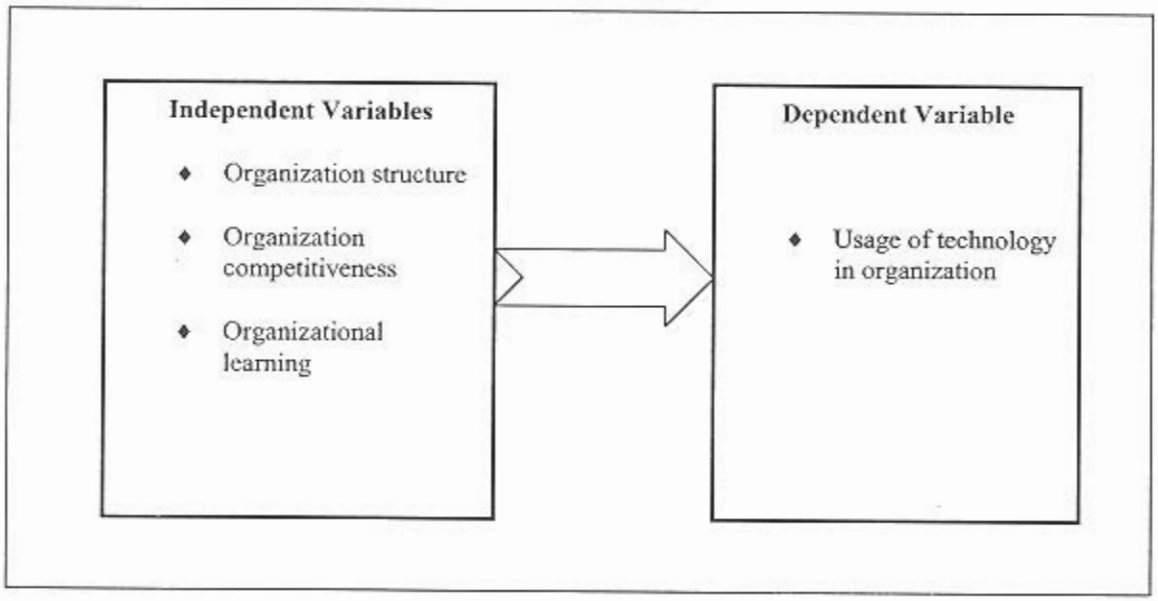

Figure 1.0: Dependent and Independent Variables

1.5 Research Hypotheses

Ho1: There is no significant relationship between organization structure with the use of technology in the organization.

Ho2: There is no significant relationship between organization competitiveness with the use of technology in the organization.

Ho3: There is no significant relationship between organizational learning with use of technology in the organization.

1.6 Significance of the Research

This paper is expected to help the organizations to recognize that organization structure, organization competitiveness and organizational learning plays an important role in the implementation of technology in the organization and also contributes to the success and survival of the organization itself. Besides, it will also discuss whether the management agrees or disagrees with the elements that are mentioned here or are there other elements at work.

More organizations in Malaysia are starting to realize that the key to resource of business is knowledge, information and ideas (Jomo and Felker,1999) and not just capital, personnel or the facilities available. As mentioned by Marquardt (1996), organizations are starting to "restructure, create integrated organizations, global networks and leaner corporate centers". Organizations are becoming more fluid, ever shifting in size, shape and arrangement due to technology advancement.

Such change that happens in the new age organization is the concept of federalism(Handy, 1989). Federalism is used to manage increasingly complex organizations in a rapidly changing environment. Charles Handy introduces the concept of federalism as an effective way to deal with these six paradoxes which are power and control, being both big and small at the same time, being autonomous but within bounds, encouraging variety but within a shared purpose, individuality but also partnership and finally, global and yet local (1989). An organization should know where it stands in its industry in order to fully utilize the technology available.

Therefore the management plays a role in facilitating knowledge of technology to the organization. They should revise their organization structure and add more value to the organization competitiveness. The management should also realize the importance of organizational learning in this era, as it will ensure organization's longer life span. Despite that, an organization should know the right fit of the people in the organization and the technology provided. Once technology and the employees fits with each other, a dynamic relationship is created and thus helps organization to succeed.

1.7 Definition of Terms

1.7.1 Technology

Technology refers to innovation; major changes in the wake of technological breakthroughs or the introduction of the latest management concepts or production techniques (Imai, 1986). According to Berniker, technology is a body of knowledge about the means by which we work on the world, our arts, and our methods. Essentially, it is knowledge about the cause and effects relations of our actions. Technology is knowledge that can be codified, studied and taught to others (1987). Technology is also knowledge of manipulation of nature for human

purposes (Betz, 1998). There are four types of technologies that are, technology as invention, technology as system, technology as application and technology as artifact. In this research context, technology is used as an application. Technology in this research context refers to a combination of digital innovation that assists in the daily tasks of employees in the organization.

1.7.2 Organization Structure

Organization Structure refers to explicit forms and procedures of an organization. Poole (n.d.) mentioned that organization structure is "the production and reproduction of a social system through members' use of rules and resources in interaction". In this context, organization structure refers to the type of structure the organization has, whether fluid or rigid, hierarchal or matrix, centralized or decentralized, that contributes to how usage of technology is distributed and by whom.

1.7.3 Organization Competitiveness

According to Porter (1985), organization competitiveness is the value that the organization is able to offer to the buyers that other organizations might not have. Bradley and associates (1993) refers organization competitiveness as to "improve customer perception of the performance of their products and services, that is, to differentiate their approach". In this context, organization competitiveness is used to approach the usage of technology, whereby it is to show that when an organization is motivated to compete in their industry, technology is highly used to produce the organization's competitive edge either directly or indirectly.

1.7.4 Organizational Learning

Argyris and Schon (1978) have defined organizational learning as a process in which members of an organization detect error and correct it by restructuring organizational theory of action, embedding the results of their inquiry in organizational maps and images. The operational term refers to "how" learning occurs on an organization wide basis. This usually refers to the systems, principles and characteristics of organization that learn as a collective entity.

1.7.5 Learning Organization

A learning organization indicates that an organization's ability to learn powerfully and collectively and is continually transforming itself to better manage and use knowledge for corporate success (Betz, 1998); it empowers people within and outside the knowledge to learn as they work and utilizes technology to maximize learning and production. The conceptual term refers to the individuals' learning in the organization and how they share information to create a learning organization.

1.7.6 Technology Management

Technology management technique that is critical to the success of projects/tasks involving technologies. Accurate planning, scheduling, control and cost accounting as well as a proper definition of goal, objectives and constraints need to be recognized (Bahouth, 1994). In this context, it refers to how the organization is able to fully utilize the technology available within the organization.

1.8 Limitations of the Research

In carrying out this research, the researcher encountered a few limitations:

1.8.1 The results of the research might vary from other organization.

1.8.2 Samples are chosen randomly among support staff in UNIMAS only.

1.8.3 There might be other elements, besides the selected here that contributes to the usage of technology in the organization.

1.8.4 Data are collected through the distribution of questionnaires. There could be a misconception on the way the researcher interprets the data comparing to what the respondent meant.

1.9 Summary

This chapter discusses the background of the study, problem statement, objectives, conceptual framework, research hypotheses, significance of research, definition of terms and limitations of the research. The next chapter discusses about the literature review.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

Technology enables organizations within an industry to capture economies of scale and scope (Bradley *et. al.*, 1993). These organizations rely on technological advances and innovation to enhance their capabilities.

2.1 Technologies and the Value Chain

For one to understand the role of technology in organization, one has to see its value chain. Hammer and Champy (1993) stated, "An important technology first creates problems, and then solves it". One has to know the value of the technology brings into the organization and not sees it as a challenge but an opportunity. As mentioned by Porter (1985), an organization is a collection of activities. Technology is embodied in every value activity in a firm and technological change can affect the organizations success through its impact on virtually any activity.

Every value activity uses some technology to combine purchased inputs and human resources to produce some output. This technology may be a simple set of procedures for personnel and typically involves several scientific disciplines or sub technologies. The technology of value activity represents one of the sub technologies.

Technology is embodied not only in primary activities but in support activities as well. Various types of technologies underlie the performance of other support activities, including those not typically viewed as technologically based. For example, parts of the procedures for placing orders and interacting with suppliers. Information systems technology, communication systems technology and transportation systems technology has revolutionized the way business are done (Colgate, 1998). Human motivation research draws on motivation research and technologies for training. An organizations infrastructure involves a wide range of technologies ranging from office equipment to legal research and strategic planning.

The technologies in different value activity can be related and this underlies a major source of linkages within the value chain. For example, product technology is related to the technology for servicing a product, while component technologies are related to overall product technology (Porter, 1985). Therefore, if an organization acquires a new technology, it can have complications for other parts of the chain.

It is crystal clear that technology is influential in an organization and depends on both the buyers' channel and suppliers' technology. An organization's product technology influences the product and process technology of the buyer and vice versa (Ghingold & Johnson, 1998). As a result, the development of technology includes areas well outside the boundaries traditionally established for research and development, which involves suppliers and buyers (Porter, 1980).

2.1.1 Information System Technology

Information systems technology is particularly influential in the value chain because every value activity creates and uses information. According to Colgate and Johnson (1998), information systems are used in scheduling, controlling, optimizing, measuring and otherwise accomplishing activates. It also has an important role in linkages among activities of all type because the coordination and optimization of linkages requires information flow among activities. The rapid technological change in information system is having a profound impact on organizations because of the influential role of information in the value chain.

2.1.2 Administrative technology

Another influential technology in the value chain is office or administrative technology (Porter, 1980). This is because clerical and other office functions must be performed as part of many value activities. Office technology can be grouped under information technology but it is separated to avoid tendency of organizational leaders to overlook it. Change in the way office functions can be performed is one of the most important type of technological trends occurring today for may organizations though few are devoting substantial resources to it.

2.1.3 Buyers' Technology

The organization's technologies are also clearly interdependent with its buyers' technologies. A firm's product technology influences the product and process technology of the buyer and vice versa (Ghingold & Johnson, 1998). For example, an organization's order processing technology influences and is influenced by the buyers' procurement methods.

2.2 Technology and Organization Structure

The potential effect of technological change on the organization structure means that the organization cannot set the technology strategy without considering the structural impact (Eason, 1988). It demands new patterns of work organization and affects individual jobs, the formation and structure of groups, the nature of supervision and managerial roles. Information technology in an organization can result in changes to lines of command and authority which, influences the need for reconstructing the organization and attention to job design (Porter, 1985). Computer based information and decision support systems influence choices in design of production or service activities, hierarchal structures and organizations of support staff. Information technology may influence the centralization or decentralization of decision-making and control systems (Mullins, 2000). New technology has typical resulted in a flatter organizational pyramid with a fewer levels of management required (Chandler, 1962). In the case of new office technology it allows the potential for staff at clerical or operator level to carry out a wider range of functions and to check their own work (Porter, 1985). The result is a change in the traditional supervisory function and a demand for fewer supervisors.

The most common technology used within the organization is information technology and telecommunications. This marriage of technology is extremely dynamic and will change the fundamental structure of organizations. The emerging of "networked" structures is enabling more cooperation among employees within the organization (Bradley *et. al.*, 1993). Therefore, to cope with the trend that technology has created, transforming the organization networked structures for competing in the future will be a major challenge for the organization (Drucker, 1989).

An organization is no longer divided into sections and departments where they just conduct their tasks within the sections and departments but in this era of technological advances, the organization move as one. This indicates that the individuals' task is interrelated and need to be referred to each other in order for it to be completed well. Each of their services are integrated. This involves the way the organization wants to work. The tools provided by technology enable them to work differently but still related to one another (Nolan & Eccles, 1993). The way they work clearly shows the evolution of new organization structure. An organization structure becomes more effective with the presence of such technologies like e-mail, phone-mail, relational databases, neural networks, parallel processors imaging and object oriented programming (Hammond, 1991). This was quoted by Betz (1998) from Hammond (1991).

Rockart and Malone (1991) has predicted that the advancement of technology will create an organization structure that is not hierarchical but more towards adhocracy. Adhocracy will be common in the future organizations. Adhocracy is also called networked organization. Networked, as mentioned by Bradley and associates (1993), are an interrelated skills and the combination of skills from different resources. People within the organization communicate with each other laterally to manage interdependent projects without relying too much on traditional hierarchical decision-making (Rockart & Malone, 1991). Therefore, enabling them to work much more effectively and efficiently. The figure below shows the organization structure that was predicted by Rockart and Malone.

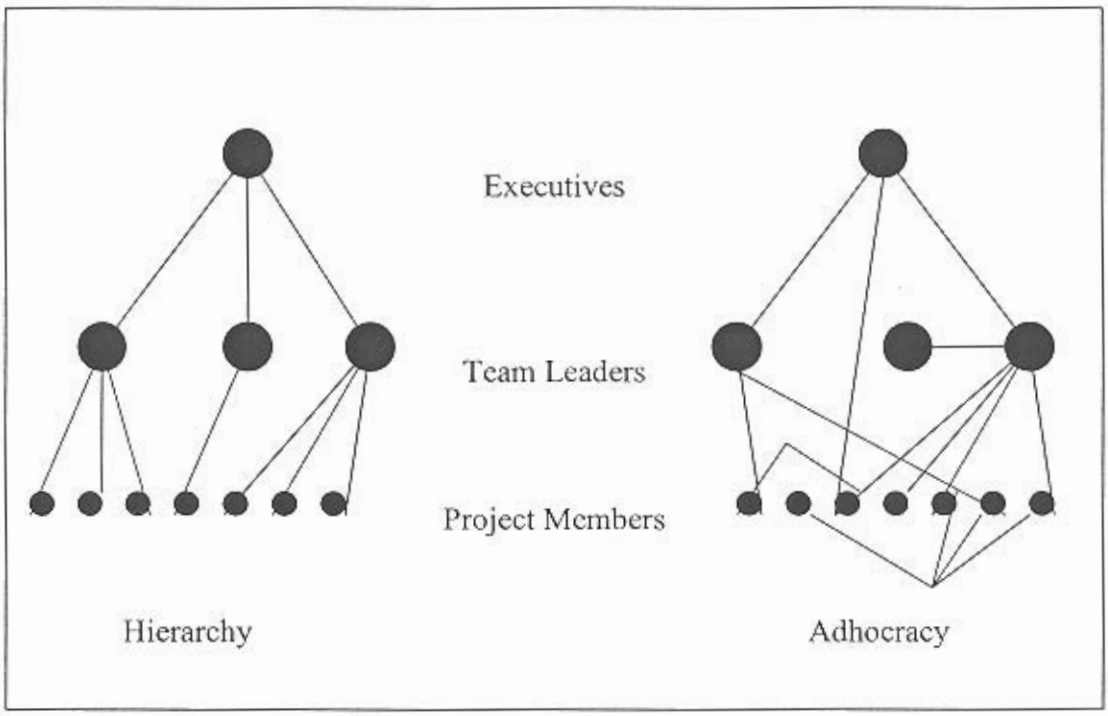

Figure 2.0: Organization Structure of the Future

Bradley, S.P., Hausman, J.A. and Nolan, R.L. (1993). Globalization, technology and competition: A fusion of computers and telecommunications in the 1990s. Massachusetts: Harvard Business School Press.

2.3 Technology and Organization Competitiveness

Organization competitiveness has been explained using a marketplace perspective (Day & Wensley, 1988). In an organization, their superiority in its skills and/or resources allows it to develop a position of advantage over its competitors. This position of competitiveness is achieved by offering customers the lowest delivered cost or superior customer value, paralleling the strategic management's paths of costs leadership, differential advantage and nichemanship (Porter, 1985). The organization optimal use of current technologies relevant to its industry and markets in creating sources or positions of advantage is implied in early competitive advantage (Day & Wensley, 1988; Porter, 1985).

Recently, a more direct role for technology management and technical knowledge for the market driven organization in achieving and sustaining competitiveness have been presented by Day and Wensley (1988). They classified that in the capabilities driving organization competitiveness, it was concluded that superior-performing organizations rely on two sets of capabilities. They are external or outside-in activities like market sensing, developing linkages, relationships with customers and internal or inside out which are technology development, manufacturing processes and so on (Wozniak, 1993).Wozniak's work was mentioned in Zuboff's book entitled " In the Age of the Smart Machine: The Future of Work and Power" published in 1998. Clearly, effective utilization of technology is central part of competitive strategy for any organizations (Wozniak, 1993). The linkage between them is compelling.

Despite that, an organization that just follows the trend of technological advances will only be able to create a brief competitiveness. Instead of lowering costs, they create a costly investment. The organization should focus on the usage of technology to respond more effectively to buyer needs for improved quality, performance, features, services or cycle time (Bradley *et. al.*, 1993). Organization should know what gives them competitiveness in order to determine the type of technology to be used and not to follow blindly what other organizations are doing. If the organization is willing to take the challenges to be different, therefore they are able to create organization competitiveness through the correct usage of technology.

2.4 Technology and Organizational Learning

Individual knowledge is necessary for developing the organizational knowledge based, however, the organizational knowledge is not a simple sum of the individual knowledge (Bhatt, 2000). Organizational knowledge is formed through interactions between technologies, techniques and the people that cannot be easily imitated by other organizations. This is because these interactions are shaped by the organization's unique history and culture (Robertson, 2000).

The implications of the interactions between technologies, technique and people have profound consequences on knowledge management. Knowledge creation refers to the ability of an organization to develop novel and useful ideas and solutions which was mentioned by Marakas (1999) in Mrinalini's and Nath's (2000) writings. According to Lynn *et al.*(2000), knowledge creation is an emergent process in which motivation, inspiration, experimentation and pure chance play an important role. For example, an organization may reconfigure and recombine existing knowledge pieces of knowledge, along with the strategy of imitation, replication and substitution (Marsick, 1987). By strengthening its research and development capabilities and monitoring external environments and by borrowing and employing external

technologies, an organization can get a better perspective of its knowledge base and may include new knowledge from outside (Bhatt, 2000).

As an organization become efficient in data processing, it can generate more information. An organization should be swift to turn data into information and information into knowledge. Therefore to manage knowledge, an organization will need to shape and redefine interactions between its people, technology and techniques. Technologies enable coordination between communities of practice by minimizing a number of human and physical constraints (Orr, 1996).

But how does an organization ensure that knowledge has been created and there is an interaction between technologies, techniques and the people within an organization? An organization should implement organizational learning so that information sharing occurs between the individuals in the organization. It is the knowledge and learning that forms the basis of an organization's competitiveness (Nolan & Eccles, 1993).

Learning is any permanent incremental change in behaviour that occurs as result of practice or experience (Warty, 1990). Learning also refers to the development of insights, knowledge and associations between past actions, the effectiveness of those actions and future actions (Fiol and Lyles, 1985). Watkins and Marsick (1993) have found out that learning is closely related with daily work activities. If an individual has knowledge, they can do different kind of chores. At the same time, they will also gain new knowledge and skills while doing their daily activities. Organizational learning indicates that an organization have an ability to adapt to current changes. Thus, knowledge exchange has to be fast and precise. Human cannot achieve this alone because depending on the human, as the exchange mechanism is inefficient (Marquardt, 1996). In this case, technology can help to make it possible. Through technology, it is possible to create on-line services that managed to improve the ways of knowledge transferred. Technology also helps to capture and continuously transfers the knowledge that had been learned to the members of the organization (Hulin & Roznowski, 1985).

Argyris and Schon (1978) have defined organizational learning as a process in which members of an organization detect error and correct it by restructuring organizational theory of action, embedding the results of their inquiry in organizational maps and images. For Marquardt (1996), organizational learning refers to how organizational learning occurs.

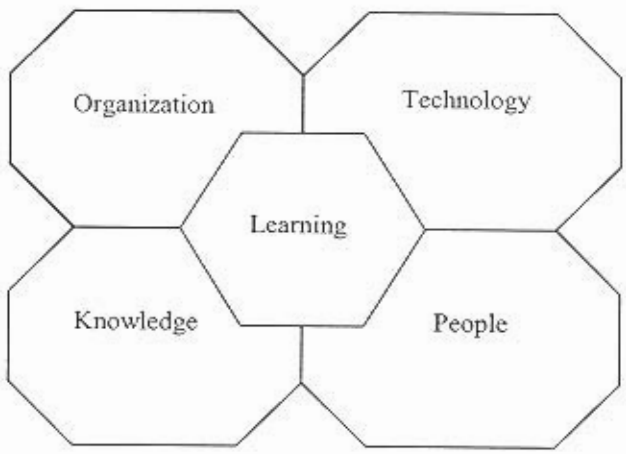

Figure 2.1: Organizational Learning Systems Model

Marquardt, M.J. (1996). Building the learning organization: A systems approach to quantum improvement and global success. New York: McGraw-Hill.

As shown in Figure 2.1, there are five closely interrelated subsystems that interact and support each other. From this model, it shows that technology plays a role in learning.

Learning takes place at the individual, group and organizational levels (Marquardt, 1996). The skills of systems thinking, mental model, personal mastery, team learning, shared vision and dialogue are necessary to maximize organizational learning. The elements in the subsystem are necessary to enhance and increase the quality and impact of the learning in the organization. For instance, technology is important to support learning in the organization.

Although technology supports organizational learning, it would be weak without the knowledge that the employees have and should gain. Therefore, the organization as a whole should create a culture whereby the people share their knowledge with each other. Besides that, the management should train the employees whenever the technology used by the organization is upgraded or when the trend changes. So, organizational learning has a significant role in the usage of technology.

2.5 Summary

There is no doubt that technology has a huge impact in our everyday lives. It becomes a sort of necessity for the human race to survive in this concrete jungle. In organizations, technology is widely used. The decreasing costs and increasing power of our computing environment create a host of opportunities, both positive and negative (Fenner *et. al.*, 1990). Use of technology will lead to the organization's survival. The next chapter will discuss the methodology used in the research.